EEG as an innovative neuroscientific method to assess stimulation on human senses

July 20, 2017
Shanghai

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LIMITS OF ESTABLISHED METHODS

- Established methods to survey proband data, like questionnaires, depend on the subjective-individual appraisal on a high stage of mental processing
  - Familiar problems of these approaches are social desirability, training effects and intercultural comprehension of single items
  - For example first impressions of materials are difficult to compare in time series
  - One further limitation is the temporal offset of the measurement
THE HUMAN AS A SENSOR AND SOURCE OF OBJECTIVE MATERIAL DATA

“Electrophysiology is useful because it is a direct measure of neural population-level activity, can link research in humans to computational models of neurobiological and neurophysiological processes, [...]“ (Cohen, 2014, p. 3)

- EEG measurements focus a more basal stage of processing and so are less susceptible to subjective adulteration and facilitate analysis underneath the detection threshold
  - Objectification by sidestepping activated mental filters
  - Measurement on or under the detection threshold
  - Real-time measurement of stimulus processing
THE RAW SIGNAL OF EEG
STEPS OF EEG ANALYSIS

- Artefact analysis
  - Adjustment of the EEG signal

- Spectral analysis
  - Extraction of the spectral components (frequency bands)

- Aggregation of processed data sets & statistical analysis
  - Nonparametric analysis
  - Analysis of variance
  - Factor analysis
PROCESSED EEG DATA
FUNDAMENTAL CONCEPT OF OPERATIONALIZATION

**Input**
Experimental isolated stimulus application by haptic-, olfactory- or optical-holistic channels of perception

**Output**
Interpretation in relation to defined indicator accordance

Development of communication with measurement database
Emotional valence  
= The spectrum of emotions between a negative and positive pole

Arousal  
= The degree of emotional activation
FIELD OF APPLICATION

Material development & evaluation > Multihuman sensoric evaluation under the perception threshold (haptic, haptic, olfactory & optical-holistic)

Interface evaluation > Attentional control & mental workload

Ergonomic analysis > Objective seat comfort measurement